

REMARKS

The examiner rejected claims 1, 8, 14 and 27 under 35 U.S.C. §102(c) as being anticipated by US PG publication No. 2003/0217223 to Nino.

The examiner also rejected claims 2-4, 6, 13, 15-18, 25-26 and 28-30 under 35 U.S.C. §103(a) as being unpatentable over Nino in view of U.S. Patent No. 6,571,319 to Tremblay et al.

The examiner also rejected claims 7 and 9-12 under 35 U.S.C. 103(a) as being unpatentable over Nino in view of the Microsoft Press Computer Dictionary, and rejected claim 19 and 21-24 under 35 U.S.C. 103(a) as being unpatentable over Nino and Tremblay, in view of the Microsoft Press Computer Dictionary

Specifically, with respect to applicant's claim 1, the examiner stated:

3. With respect to claim 1, Nino teaches a method comprising:  
converting memory access instructions into standard formatted memory access instructions, in pars 21-23 where the memory access read or write is divided into the standard formal memory access commands, precharge, activate, and read (or write).

generating a plurality of memory access partitions containing corresponding subsets of the intermediary standard formatted memory access instructions, with the plurality of memory access partitions directed to specific memory banks. In pars. 21-23 where a plurality of memory access partitions consists of a precharge an activate and a read or write directed towards memory bank A or B.

generating a match set of instruction patterns. Including matches of instruction patterns to the corresponding subsets of the intermediary standard formatted memory access instructions in the plurality of memory access instructions, in pars. 26-27 where the match set is the two instructions that are combined; and

transforming the matches to vector memory access instructions, in pars. 26-27. (Final Office Action, pages 2-3)

Further, responding to applicant's arguments in the Reply to Final Action of March 21, 2007, the examiner stated in the June 6, 2007, Advisory Action:

1. Applicant's arguments filed 5/08/07 have been fully considered but they are not persuasive. On page 10 of the application, Applicant writes "Even assuming, for argument sake, that the combined commands could be viewed as intermediary standard formatted commands, Nino does not describe intermediary commands that are matched to command (or instruction) patterns." However, in the present rejection, the Examiner is not treating the combined commands as intermediary standard formatted

commands. The Examiner is treating the combined commands as vector memory access instructions. The examiner is treating precharges, activated and read/writes as the intermediary standard formatted commands. For example, in fig. 4, numeral 20, the commands "activate A" and "precharge B" are each "intermediary standard format commands" and the combination is a "vector memory access instruction. (The related part of the specification is par. 27). The "pattern" recognized is that the individual intermediary standard formatted commands access separate banks, and thus may be combined and executed at the same time. (Advisory Action, page 2)

Applicant amended claim 1 to clarify that pre-defined instruction patterns are compared to the intermediary standard formatted memory access instruction, and based on that comparison matching instructions are identified. Support for this clarification is provided, for example, at FIGS. 5 and 6, and at page 6, line 6, to page 8, line 11. Applicant similarly amended claims 15 and 27.

Thus, applicant's method, as recited in claim 1, includes transforming matching instructions, identified based on comparisons of pre-defined instruction patterns to intermediary standard formatted memory access instructions, to vector memory access instructions.

Nino, on the other hand, describes a circuit and method of operation for combining commands in a DRAM (Abstract). Specifically, Nino explains:

[0026] FIG. 4 depicts a combined command embodiment in which each bank in the memory array is read from one time and written to one time. These are the same operations that were performed in FIG. 3, and thus the advantages of the combined commands may be seen in the fewer clock cycles taken to complete the operations, that is, 27 clock cycles in FIG. 4 rather than 31 clock cycles in FIG. 3. The same latency and operational periods described above for FIG. 3 apply to FIG. 4. FIG. 4 is arranged in a manner similar to FIG. 3, with commands to each bank under the column headings, A, B, C and D. There are now two columns labeled "COMMANDS" because more than one command may be given at once. Input/output to the DRAM is noted under the "I/O" column. Commands to more than one row at a time are called row/row commands and commands to a row and a column at the same time are called row/column commands.

[0027] In this example, commands are combined, as seen in command sequences 20, 22, 24, 25, 26, 27 and 28. Idle time is again depicted by blank boxes. In sequence 20, a combined row command is given to two different banks, activate A and precharge B. The command will be given to the same or different rows in both A and B. In sequence 22, a column command to one bank is combined with a row command to another bank, Read A and Activate B. In the next sequence 24 a combined command is given to

Activate C and Precharge D, that is, to activate a particular row in bank C and precharge that same row or a different row in bank D. Note that the sequence used for reading or writing is not changed from "precharge," "activate," and then "read" or "write." Time is saved by combining commands as shown. If more read and write operations were in progress in FIG. 4, what appears as primarily idle time (blank boxes) would have more combined operations and more time would be saved. As it is in this sequence, the four read and write operations consume 27 command clock cycles, or about 216 ns at 125 MHz (8 ns per command cycle). This saves about 32 ns, about a 15% speed-up of this particular read/write operation for the DRAM of FIG. 2. Other data input/output operations may save more or less time depending on the actual operations needed and taken.

[0028] In order to implement a combined command DRAM, certain modifications should be made to the control logic used for operating DRAMs. Until now, commands were typically issued one-at-a-time, rather than combining commands, with the exception of unique situations such as an "auto-precharge" or "precharge all," commanding rows only to more than one bank, or write with auto-precharge, combining row and column commands on the same bank. By contrast, embodiments of the present invention combine commands either to rows in multiple banks, or to rows and columns in multiple banks. (FIGS. 3 and 4 and pages 2-3, paragraphs 26-28)

Nino's commands are combinations of two or more DRAM commands that are executed simultaneously rather than at separate times, as has been done by the prior art that Nino alludes to.

However, Nino neither describes nor suggests that intermediary commands are compared to pre-defined command (or instruction) patterns to identify matching instructions (or commands). Indeed, all Nino does is combine discrete commands so that those same commands would be performed simultaneously, thus shortening the execution time that otherwise would be required. Such combining of commands does not involve any type of pattern matching or comparison operations because there is no need to determine the exact nature of the command.

Accordingly, Nino fails to disclose or suggest at least the features of "identifying matching instructions based on a comparison of pre-defined instruction patterns to the intermediary standard formatted memory access instructions in the plurality of memory access partitions; and transforming the identified matching instruction to vector memory access instructions," as required by applicant's independent claim 1. Independent claim 1 and the claims that depend from it are therefore patentable over the cited art.

Applicant's independent claim 27 recites "identify matching instructions based on comparisons of pre-defined instruction patterns to the intermediary standard formatted memory access instructions in the plurality of memory access partitions; and transform the identified matching instructions to vector memory access instructions." For reasons similar to those provided with respect to independent claim 1, at least these features are not disclosed by the art. Applicant's independent claim 27 and the claims depending from it are therefore patentable over the cited art.

As noted, the examiner rejected independent claim 15 as being obvious over Nino in view of Tremblay. Independent claim 15 recites "[a] compilation method comprising: converting source code that includes memory access instructions that read or write less than a minimum data access unit (MDAU) to intermediary code that includes memory access instructions that read or write a multiple of the minimum data access unit; converting the memory access instructions of the intermediary code into intermediary memory access instructions that have a format including a base address plus an offset; grouping subsets of the intermediary memory access instructions into a plurality of memory access partitions, with the plurality of memory access partitions containing intermediate memory access instructions directed to specific memory banks; and transforming the intermediary memory access instructions in the subsets corresponding to the plurality of memory access partitions that match pre-defined instruction patterns to vector memory access instructions."

The examiner admitted that "[t]he invention of Tremblay is not directed towards a plurality of banks in a memory and therefore does not teach the last two limitations of claim 15" (Final Action, page 6). Moreover, as explained in applicant's Amendment in Reply to Action of November 3, 2006, Tremblay determines if a particular retrieved instruction is a "store pair instruction" prior to placing that instruction in a buffer 260 (if in fact that retrieved instruction is a "store pair instruction"). Tremblay, however, does not perform any additional processing on any instructions placed in buffer 260 other than outputting the instructions in the buffer as a combined instruction (see Tremblay, col. 5, line 31, to col. 6, line 12.) Thus, Tremblay does not disclose or suggest at least the features of "transforming the intermediary memory access

instructions in the subsets corresponding to the plurality of memory access partitions that match pre-defined instruction patterns to vector memory access instructions."

The examiner argues that Nino teaches the last two features of independent claim 15. However, for reasons similar to those provided with respect to independent claim 1, applicant contends that Nino does not disclose or suggest at least the features of "transforming the intermediary memory access instructions in the subsets corresponding to the plurality of memory access partitions that match pre-defined instruction patterns to vector memory access instructions," as required by applicant's independent claim 1.

Because neither Nino, nor Tremblay, discloses or suggests, alone or in combination, at least the features of "transforming the intermediary memory access instructions in the subsets corresponding to the plurality of memory access partitions that match pre-defined instruction patterns, to vector memory reference instructions" applicant's independent claim 15 and the claims depending from it are therefore patentable over the cited art.

It is believed that all the rejections and/or objections raised by the examiner have been addressed.

In view of the foregoing, applicant respectfully submits that the application is in condition for allowance and such action is respectfully requested at the examiner's earliest convenience.

All of the dependent claims are patentable for at least the reasons for which the claims on which they depend are patentable.

Canceled claims, if any, have been canceled without prejudice or disclaimer.

Any circumstance in which the applicant has (a) addressed certain comments of the examiner does not mean that the applicant concedes other comments of the examiner, (b) made arguments for the patentability of some claims does not mean that there are not other good reasons for patentability of those claims and other claims, or (c) amended or canceled a claim does not mean that the applicant concedes any of the examiner's positions with respect to that claim or other claims.

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Respectfully submitted,

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